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Case report

Penetrating cardiac injuries in blunt chest wall trauma

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ABSTRACT

The present photocase illustrates the possible mechanism of direct cardiac injuries from broken sharp jagged fractured ends of ribs in blunt force trauma to the chest in run over traffic mishaps. We propose that the projecting fractured ends of the ribs penetrate the underlying thoracic organs due to the transient phenomenon of deformation of chest cavity under pressure in run over traffic mishaps.

1. Introduction

Cardiac injuries in non-penetrating chest trauma is uncommon. Transmission of the kinetic force in direct impact to the chest wall, causing compression of the heart between the sternum and the spine, and compression of the lower extremities and abdomen with rapid increase in intrathoracic hydrostatic pressure remain the two commonly reported mechanisms of cardiac injury in blunt force trauma.[1] The fractured ends of the ribs are rarely reported to cause penetrating injuries directly to the heart. A case of run-over traffic mishap where the sharp ends of the fractured ribs have caused extensive damage to the heart is reported.

2. Case summary

A 45-year-old man fell from a moving bus while trying to disembark. By the time the brakes were applied the tyre of the moving bus ran over the left side of his chest and head. No external injuries or deformities were apparent on the chest wall. On internal examination, intercostal muscle contusions were present but apparently the rib cage had retained its shape due to recoil of the intercostal muscles (Fig. 1A). It was only on further dissection that the major insult to the pericardium and the heart was observed. The pericardium was torn with extensive injuries to the heart (Fig. 1B). Fracture of the 2nd to 6th ribs along the anterior axillary line on the left side was observed. It is illustrated how the sharp jagged ends of the fractured ribs move medially on external pressure to cause penetrating cardiac injuries (Fig. 1C). The extent of cardiac injuries is evident in Fig. 1B and D.

3. Discussion

Rib cage acts as a protection for the thoracic organs and support for the vertebral column. Penetrating injuries to the heart in blunt chest trauma thus remain uncommon. Even when the ribs are fractured recoil of the intercostal muscles keeps the architecture of the rib cage intact preventing subsequent injuries to the thoracic organs. The present case illustrates the possible mechanism of direct cardiac injuries from broken sharp jagged fractured ends of

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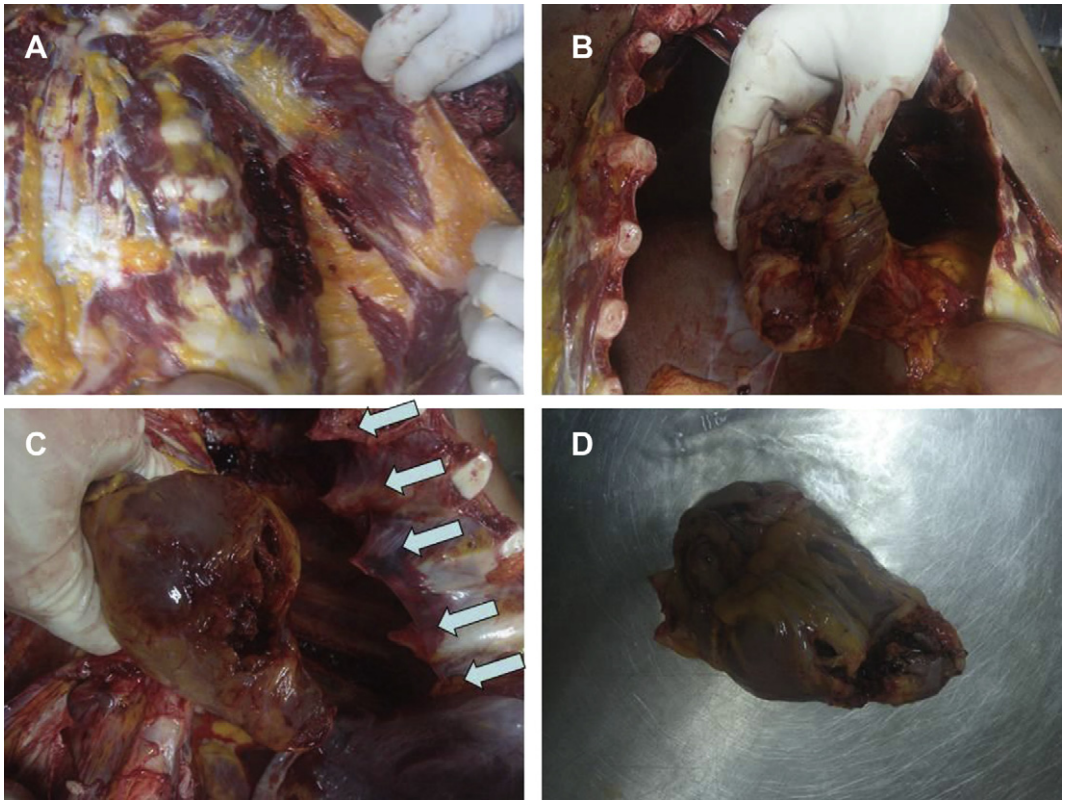

Fig. 1. Injuries sustained to the ribs and heart in a run-over traffic mishap. (A – Retained shape of the rib cage with intercostal muscle contusions; B, D – Extensive injuries to the heart; C – Projecting ends of the fractured 2nd to 6th ribs on the left side that cause penetrating trauma to the heart).

ribs in blunt force trauma to the chest in run over traffic mishaps. We propose that the projecting fractured ends of the ribs penetrate the underlying thoracic organs due to the transient phenomenon of deformation of chest cavity under pressure in run over traffic mishaps. Cardiac lacerations caused directly as a result of rib fractures although is a rare phenomenon in blunt force trauma to the chest, its possibility should be explored so that prompt and early treatment saves the patient from a fatal outcome.

Conflict of interest

The authors have no conflict of interest to declare.

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Ethical approval

None declared.

Reference

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